Manuscript Report No. 88-03

Manitoba Piping Plover Survey, 1987

By Moszynski Robert, W.H. Koonz
and Ken De Smet
April 1988

Manitoba
Natural Resources
Wildlife
Biological Services

88-04605/

NOT FOR PUBLICATION

This manuscript report is for your information only, with the understanding that its contents are not for general distribution or publication. Many of the reports in this series are in the nature of interim progress reports, and the current data will eventually form part of final reports for publication, or will be subject to additional analysis and synthesis. The information herein is the property of the Wildlife Branch and the author reserves priority for publication. Citations should be by permission only, and referred to as a "personal communication" rather than listed under "reference".

Prepared by:

W. H. Koonz

Approved by:

Robert W. Reid
Supervisor

Merlin W. Shoesmith
Section Chief/Director

MANITOBA PIPING PLOVER SURVEY, 1987

Robert Moszynski
W.H. Koonz
Ken De Smet
April 1988

TABLE OF CONTENTS

	Page
Table of Contents	i
List of Tables	i
Introduction	1
Methods	2
Results	3
Detailed Account of Sites	3
Active Sites	3
Inactive Sites	13
Discussion	20
Recommendations	21
Habitat Manipulation	22
Acknowledgements	23
Contacts	24
Appendix I	25
Appendix II	1a

LIST OF TABLES

	Page
Table 1	4
Table 2	5
Table 3	6
Table 4	7

INTRODUCTION

The Piping Plover (Charadrius melodus) is a North American shorebird whose former breeding range included sandy open beaches from the Atlantic coast of South Carolina northward to the St. Lawrence River, westward through the Great Lakes and across the Prairie Provinces. Breeding populations flourished around prairie lakes and the shorelines of rivers such as the Missouri, Saskatchewan and Platte. Piping Plovers winter along the Gulf Coast (especially Texas).

Piping Plovers have been in decline throughout their range for several decades. Breeding populations have disappeared from many locations, especially along the east coast and throughout the Great Lakes. They have been declared endangered throughout their range with human disturbance and predation considered major contributors to the decline.

In Manitoba, the Piping Plover is known to nest along the shores of Lake Manitoba, Lake Winnipeg and West Shoal Lake. Haig studied Piping Plovers in Manitoba from 1981-1986. Her primary study areas were the southern beaches of Lake Manitoba and West Shoal Lake. In 1986 she directed a major search for Piping Plover breeding locations in the Province. Appendix II is her unpublished account of that breeding survey. The present report is a follow-up to Haig's work which identified the shores of Lake Winnipeg as a major area of potential Piping Plover habitat. Results are intended to assist in the management of critical Piping Plover breeding areas provincially and as part of a National Recovery Plan for the species.

METHODS:

Potential nesting sites for the Piping Plover were located using geological maps which indicated suitable habitat such as sand beaches, spits and flats. Some possible nesting sites observed during 1986 aerial surveys by Department of Natural Resources staff were also checked. Other locations were found by visiting known nesting areas and by interviewing fishermen and local area residents. Possible nesting areas were visited by boat, on foot or by all-terrain vehicle and viewed using 7x binoculars or a 20x scope. All-terrain vehicles were driven at the water's edge to prevent nest disturbance. Sites were visited from May until late August with inactive areas generally visited only once. Descriptions of all sites were made, whether active or not, including the type of substrate, area of the beach or flat, distance from water, and adjacent vegetation. The numbers of adults, juveniles and eggs were recorded on each visit.

Some adult and juvenile birds were captured and banded with a color code allotted by the Canadian Wildlife Service (dark green over a white plastic band on the right leg and a white plastic flag over an aluminum band on the left leg). The white plastic flags provided by CWS were approximately 5 mm wide and 11 mm long. These flags were molded by placing them in boiling water until the plastic was soft then wrapping them around a nail with the same diameter as a #1A aluminum leg band. The ends were then pinched together with a pliers and placed in cool water to harden. If the bands had a loose closure they were discarded. The plastic bands were placed on the birds' legs by hand. The aluminum bands needed to be opened with a pair of needle-nose pliers. Once opened, the aluminum bands were placed on the legs and carefully closed with the pliers until the band ends were snug.

Unfledged juveniles were caught by outrunning them; fledged juveniles and adults were caught using a 3 meter x 30 meter mist-net attached to a 3.2 meter aluminum pole at each end. The mist-net was placed parallel to the water at the water's edge or slightly into it. With the use of an all-terrain vehicle or on foot, the birds were herded toward the net. Since the birds' natural tendency is to fly toward open water, startling them as they neared the net caused them to fly into it.

The mist-netting technique was most successful on linear beaches where bird movements could be predicted. It was less effective on flats where one net was adequate. When nests or unfledged juveniles were present the mist-net was placed approximately 40 m away from their location. With this set-up, adults could be caught since they tended to land or fly on the side of the observer, opposite their young. Captured birds were checked for markings and ages were recorded. Adults were identified by a dark black band across the upper breast, an orange bill and black markings on the head. Juveniles had an incomplete pale-coloured chest band, a black bill and no head markings (Sue Haig, personal communication).

RESULTS

During the 1987 field season, a total of 507.5 km of lakeshore and island habitat was surveyed for Piping Plovers (Table 1), mostly along the shores of Lake Winnipeg (280 km) and Lake Manitoba (87 km). The remaining 140.5 km. included seven islands, one river and nine other lakes (See Appendix I for a list of place, names and specific map locations). In total, 128 Piping Plovers were observed (89 adults and 39 juveniles) during the summer (Table 2). Ten of the 41 sites visited contained Piping Plovers. The average clutch size for the 11 nests found was 3.46 (Table 2) (hatching success rate was undetermined). Of the 10 nesting locations surveyed, the north bar of Gull Bay and West Shoal Lake accounted for 65% of the adult birds and 78% of the juveniles observed (Table 2). Sixteen juveniles and three adult Piping Plovers were banded during the summer (Table 3). Table 4 shows the dates various sites were visited in which no Piping Plovers were recorded (see Appendix 1 for map locations).

DETAILED ACCOUNT OF SITES

A. Active Sites

1. Clandeboye Bay

A special conservation area for nesting Piping Plovers is located south of St. Ambroise Park on Lake Manitoba. The site consists of a sandy shoreline with scattered rocks up to 8 cm in diameter. The

Table 1. Piping Plover Shoreline Coverage, Manitoba 1987.

Location	Distance Covered(km)
Lake Winnipeg North Basin	
West Shore[1]	170
Eagle Island	8
George Island	3
Lake Winnipeg South Basin	
West Shore[2]	70
East Shore[3]	40
Elk Island	3
Grand Marais Island	0.5
3 Riverton Sound Islands	1.0
Lake Manitoba	
East Shore[4]	85
West Shore[5]	2
Katimik Lake	50
Salt Point	2
West Shoal Lake	10
Winnipegosis	2
Buffalo Lake	1
Cross Bay	10
Kawinaw Lake	1
Little Limestone Lake	2
William Lake	2
Saskatchewan River[6]	45
Total	507.5

[1]Limestone Point south to Wicked Point.
[2]Hecla Causway south to Willow Island.
[3]Elk Island south to Balsam Bay.
[4]Dog Lake Indian Reserve south to Clandeboye Bay.
[5]Bluff Creek vicinity.
[6]From The Pas east down river.

Table 2. Piping Plover number and productivity data, Manitoba 1987.

Location	Date	No. Nests	Eggs	No. Juveniles	No. Adults
Clandeboye Bay	May 13	-	-	-	4
	July 24	-	-	2	2
	July 27	-	-	2	0
	Aug. 5	-	-	-	-
Grand Marais	May 11	-	-	-	5
	July 2	-	-	-	3
	July 21	-	-	-	1
	Aug. 2	-	-	-	0
Gull Bay, North Bar	May 26	-	-	-	16
	June 3	2	2;2	-	12
	June 17	2	4;4	-	12
	June 23	2	4;4	-	16
	July 9	1	4	1	16[1]
	July 10	1	4	9	28
	July 14	2	1;4	2	16
	July 23	-	-	7	9
Gull Bay, South Bar	June 27	1	4	0	4
	July 23	0		1	12[2]
Katimik Lake	June 2	-	-	-	-
	June 16	-	-	-	-
	July 8	1	4	-	8
	July 16	1	4	-	2
	July 24	0	-	-	-
Long Point	June 26	1	3	-	2
	July 24	-	-	-	-
Riverton	May 8	-	-	-	-
	June 12	3	4;4;2	-	6
	July 28	-	-	1	2
	Aug. 7	-	-	1	-
Salt Point	May 19	-	-	-	1
West Shoal Lake	May 5	-	-	-	2
	June 9	1	4	-	1
	July 12	-	-	12	26[3]
	July 13	-	-	6	6
	July 27	-	-	3	3
	Aug. 4	-	-	6	-
Winnipegosis	July 8	-	-	-	3[4]
	July 30	-	-	4	1
		11	38	39	89

[1]Some birds may have come from the North Bar.
[2]Not all birds positively identified as to age.
[3]Birds reported by Stewart Holohan.
[4]Birds reported by Bill Koonz (unaged).

Table 3. Piping Plover Banding Data, Manitoba 1987.

Location	Date	Band Number	Adult	Juvenile
Gull Bay, North Bar	July 9	26801-991		X
Gull Bay, North Bar	July 10	26807-991		X
Gull Bay, North Bar	July 10	26803-991		X
Gull Bay, North Bar	July 10	26805-991		X
Gull Bay, North Bar	July 10	26804-991		X
Gull Bay, North Bar	July 14	26809-991		X
Gull Bay, North Bar	July 14	26802-991		X
Gull Bay, South Bar	July 23	26810-991		X
Gull Bay, North Bar	July 23	26808-991		X
Gull Bay, North Bar	July 23	26806-991		X
Gull Bay, North Bar	July 23	26811-991		X
Gull Bay, North Bar	July 23	26812-991	X	
Gull Bay, North Bar	July 23	26813-991		X
Gull Bay, North Bar	July 23	26814-991		X
Gull Bay, North Bar	July 23	26815-991		X
Clandeboye Bay	July 27	26816-991		X
Clandeboye Bay	July 27	26817-991		X
Riverton	July 28	26818-991	X	
Riverton	July 28	04953-861	X	—
Totals			3	16

Table 4. Inactive Piping Plover Sites, Manitoba 1987.

Arnes	May 8
Balsam Bay	Aug. 6
Bluff Creek	June 23
Buffalo Lake	May 25
Cross Bay	May 26;July 16
Denbeigh Point	June 4
Dog Creek Reserve	May 7
Eagle Island	July 17
Elk Island	July 29
Finns	May 8
George Island	July 15
Grassy Point	June 4
Hecla Causway	May 8
Hnausa	May 8
Kawinaw Lake	June 4
Limestone Point	June 4;July 17
Little Limestone Lake	July 13
Long Point, North Shore	July 15
Long Point, South Shore	May 26
Oak Point	May 9
Patricia Beach	May 10
Pebble Beach	May 27
Sandy Point	May 9
Saskatchewan River	Aug. 10
Scotch Bay	May 9
Sturgeon Bay	June 25
Sturgeon Gill Creek	May 26
Twin Beaches	Aug. 5
Valhalla Beach	May 8
William Lake	July 13
Willow Point	May 8

shoreline is approximately 50 m wide, with the upper portions of the beach being consumed by encroaching vegetation (grasses, shrubs). On 3 May, two pairs were observed there. One bird had a yellow leg flag. On 24 July, two juveniles were seen and on 27 July they were banded. During mist-netting at this site the birds were more easily herded using an all-terrain vehicle than when on foot. The birds appeared more nervous and not as easily directed toward the net when on foot.

2. Grand Marais

A sandy point approximately one km long located south of the town of Grand Marais on the east side of Lake Winnipeg. The site consists of sand and scattered rock up to 8 cm in diameter. The point varies in width from 40-70 m and its southern portion is heavily wooded with willow shrubs and grasses while the northern portion has small amounts of grass where the plovers were present. An island with a sandy shoreline and treed interior is approximately 0.5 km south of the point. There is an open sand, pebble area along the east portion of the island where Piping Plovers have been seen and banded previously but none were observed there when it was visited this year.

On 11 May, five adult unbanded birds were seen on the north end of the point. No nests were discovered although intense feigning was evident. Checks on 2 July and 21 July resulted in three and one bird seen, respectively, but no nests or juveniles were recorded.

3A. Gull Bay North Bar

The north sand bar of Gull Bay consists of a sand point approximately 6 km long. The lake side of the point (south east) consists of fine sand, gravel and rocks up to 10 cm in diameter. The nesting area available on the southeast shore varied from 10-40 m wide. The center of the bar is vegetated with grasses, shrubs and dense willow stands. The Gull Bay side (north west) of the bar has a narrow shoreline (up to 4 m wide) consisting of gravel and sand unsuitable for plover nesting. The southeast side of the bar provides excellent Piping Plover habitat. On 26 May, 16 adult birds were

discovered foraging along the east shore of the bar. No nests were located at that time.

On 3 June, six pairs of adults were seen, of which two pairs had nests with two eggs each. These nests were rechecked on 17 June revealing four eggs each. The nests consisted of depressions in the sand approximately 2.5 cm deep with a diameter of 8-10 cm. They were both lined with pea-sized pebbles and were in a sand area with scattered rocks up to 9 cm in diameter. It was suspected that the remaining pairs had nests or were close to laying as their territorial defenses were strong. The nests were located 6 and 8 meters from the water. On 9 July the nest locations had been washed by storm tides, but it is not known whether the eggs had hatched. On 23 June, 4 adult birds were observed on the southern tip of the sand bar and it was suspected that they had flown into the area after the storm had destroyed their nests elsewhere. A new nesting attempt was surely made as no nests or birds had been seen at that location prior to 9 July. On 9 July and 14 July, this area contained nests with four and one egg respectively. Juvenile birds began to appear on the point on 9 July when one was banded there. More young were present but the exact number was not determined and they were left undisturbed to be brooded. With favourable weather on 10 July, approximately 35 birds were seen on the point, at least 28 being adults. On 10 July four juveniles were banded and approximately five more were seen but not caught. The influx of birds was suspected to be the start of fall migration by non-breeders, unsuccessful breeding adults and/or adults with fledged juveniles. Two new juveniles were banded on 14 July. The number of adults seen there on that date had decreased to 16 with seven young including one dead chick. The cause of death for the chick was not known. On 23 July, six juveniles and one adult were banded. Four of the juveniles resulted from a late nesting effort (July 9), while the remaining juveniles were older. A total of 15 birds were seen that day consisting of nine adults and six juveniles. Only four of the adults had chicks, the others appeared to have none as they did not display. At that time all known nests on the north bar of Gull Bay had hatched but it was difficult to determine the success as the birds congregated

at the tip of the north bar where families were difficult to separate.

3B. Gull Bay, South Bar

The south bar of Gull Bay is located approximately 3 km south of the north bar's point. The suitable nesting area is at the north end of the south bar and is approximately 300 m long varying in width from 10-60 m. This nesting area is unstable and changes with wind, ice and water level conditions.

The substrate is mainly sand with scattered gravel and rock. There is also some grassy vegetation on a section near the northern tip of the point where some Caspian Terns nested in 1987. At the southern end of the point, marsh grasses, cattails and willow thickets begin. On 27 June, two pairs of birds were observed on the south bar, but only one nest with four eggs was found. It was on the south east end of the point approximately 15-20 m from the water and was lined with small pebbles and a few clam shell fragments. The nest site was revisited on 23 July but no eggs or egg fragments were found. There were 13 birds observed flying along the point but their age status was undetermined. One juvenile was mist-netted and banded from the group. It is possible that the birds seen on the point may have flown over from the north bar as it is a short flight. It is suspected that this type of shuttling occurs frequently.

4. Katimik Lake

This is a shallow lake with no outlet, located in a limestone basin on the south side of Hwy 327, southwest of Grand Rapids. Approximately 10-15 km of the 60 km shoreline is suitable for Piping Plover nesting. Although not a long linear distance, the total area for the birds is much larger since there are mud and sand flats which extend up to .75 km in width. Within these flats, there are isolated pockets of water and some grasses which can be used by juveniles for feeding and concealment. Since the flats do not rise substantially above the water, they are easily flooded with slight water increases, and in high water years they may be reduced drastically. Since a pair of Piping Plovers was found nesting there, it is suspected

that the Piping Plovers visit the area regularly and have found suitable nesting habitat there in the past.

Six individual birds and one pair with a nest containing four eggs were seen on 8 July at the south bay of the lake. The lake was rechecked on two occasions (July 16 and 24), only the adult nesting pair was seen again. Rechecking on 24 July did not reveal the adult birds and the eggs were gone with no indication as to nesting success. It was noticed that the nesting birds on Katimik were particularly docile and it may be in response to a lack of human contact.

5. Long Point

Along the north side of Long Point there are bays which have become enclosed due to the piling of sand lining a beach ridge. One of these beach ridges, located close to the northwest end of Long Point, served as a nesting site for a pair of Piping Plovers. On 26 June a nest with three eggs was located approximately 200 m east of the inlet leading into the bay and was 15 m from the water. This area appears excellent for plovers but vegetation is quickly consuming valuable nesting habitat so it is not known how long it will be available for future nesting birds.

Upon rechecking the area on 24 July, no nest was found and sign of Piping Plovers was not apparent, therefore, it is likely the nest was destroyed and the pair had left.

6. Riverton

The shoreline of Lake Winnipeg east of Riverton along Highway 329 consists of a 10-20 m wide beach of mainly sand and gravel. It is bordered by marsh, grassses, and in some locations, forest. The shore appears suitable but no Plovers were found nesting there, possibly due to human recreational use. Off the northern shore of the mainland there is a series of three sand islands extending between Riverton marsh eastward toward Sandy Point on Hecla Island. These islands consist of sand and gravel and contain zones of grasses and willows. The closest island, approximately 50 m from shore, had one nesting pair with two eggs on 12 June. The second island had two

nesting pairs with four eggs each on that date. Nesting on the islands, along with the Piping Plovers, were major colonies of Common Terns and Ring-billed Gulls. It was noted that the plover's nest was always positioned so that Common Terns were separating them from the Ring-billed Gulls. Revisiting the site on 28 July resulted in two adults being mist-netted while a fledged juvenile was seen but not caught.

One of the adults mist-netted had already been banded so the colour sequence of its bands was reversed because the aluminum band was on the right leg.

Adequate shoreline existed on the main lakeshore and on 7 August a juvenile was seen flying to the shore from the island and only returned to the island when disturbed on the shore.

7. Salt Point

Salt Point, located northeast of Mafeking on Lake Winnipegosis, contained a salt flat lake which consisted mainly of dried mud and clay with some salt and sand. Observation of this site on 18 May disclosed one adult Piping Plover. Further searching did not reveal other birds or nests.

8. West Shoal Lake

A shallow saline lake located north of Woodlands. The shoreline consists of mud with scattered patches of gravel and rock ranging up to .75 m in size. Although the south end of the lake apparently has the majority of birds, a nesting bird was found with 4 eggs on 9 June along the west shore of the lake. The location of its mate was not known, but the pair was seen near the nest site on 13 July with two fledged juveniles. Eight other birds were seen that day at the south end of the lake near the observation towers, three to four were juveniles. On 27 July, three juveniles and three adults were seen at the lake's south end but mist-netting them was unsuccessful.

Information provided by Stewart Holohan indicated that there were 26 adults and 12 juveniles present at the south end of the lake on 12 July, six juveniles were present on 4 August. Four of the

adults had been colour banded, however, the band combinations were not read.

9. Winnipegosis

A shallow saline lake located 18 km north of the town of Winnipegosis west of Lake Winnipegosis, had a substrate consisting of heavy organic mud with some sand and scattered rock along the shore. The lake had two mud flats present, one at the north end and the other at the south end of the lake. It was on the south end that the birds were seen on two occasions. On 8 July, three birds (age unknown) were reported feeding there by Bill Koonz. On 30 July, five birds comprised of four fledged juveniles and one adult were observed feeding near the same location.

B. (INACTIVE SITES)

10. Arnes

The beach along the shore of Lake Winnipeg in this area consists of a sand and gravel mixture. The points contain large rocks unsuitable for plover nesting. The shore varies in width but is generally near 10 m, bordered by a dense stand of trees.

11. Balsam Bay

Located on the east side of Lake Winnipeg this beach is wide with ample nesting territory considered suitable for plovers. As in many areas where no nesting occurred, the forest grows up to the shoreline. It appears the birds will only utilize an area if there is visibility in all directions.

12. Bluff Creek

Located north of Amaranth on the west short of Lake Manitoba, this site, visited on 23 June, consisted of a narrow beach approximately 3 m wide of fine sand and gravel. This area would not likely harbour any birds as visibility was inadequate due to vegetation encroachment.

13. Buffalo Lake

There were no birds seen at Buffalo Lake on 25 May. The lake is located on the west side of Lake Winnipeg, north of Grand Rapids. It is surrounded by forest and the majority of the shoreline consists of marsh grasses, unsuitable for Piping Plovers.

14. Cross Bay

Cross Bay is the reservoir for the Grand Rapids Hydro Dam with a shoreline of dikes, flooded forest and occasional flats provided by fluctuating water levels. On 26 May and 16 July, the north and south side of Cross Bay were checked for flats and birds but none were seen. Adequate flats were found on the north side of Cross Bay. They consisted of small rock, silt and organic debris up to 400 m wide. The resevoir normally fills during the summer limiting its value as a nesting area.

15. Denbeigh Point

Denbeigh Point, located on the north shore of Lake Winnipegosis, has minor amounts of sand with mainly large rocks on its shore. It was visited on 4 June but no birds were seen probably due to a lack of suitable habitat (sand).

16. Dog Creek Reserve

Located on the east side of Lake Manitoba, this shoreline resembles Shoal Lake but did not hold any birds. Although there is adequate visibility with no forest within 50-100 m of the shore, the sandy part of the shoreline is considered too narrow to be used by nesting Piping Plovers.

17. Eagle Island

Located at the north end of Lake Winnipeg, this island contains suitable habitat for nesting along its west bay. The shore consists of mainly sand with little if any gravel and is approximately 20 m wide and 0.5 km long. This site was visited on 17 July. Juveniles should have been seen if they had been present. It is possible that

this site is beyond the northern range of Piping Plovers in Manitoba.

18. Elk Island

A small island off the northern part of Victoria Beach on the east side of Lake Winnipeg. It is composed of a sand spit with sand dunes, gravel and some grasses. This island offers excellent Piping Plover habitat on its southern shore. Although birds have nested there in the past, none were seen on 29 July. The absence of birds could have resulted from them having already migrated.

19. Finns

The shoreline along the west shore of Lake Winnipeg at this point consists of sand and gravel and is approximately 10 m wide. The problem with this site is heavy human use.

20. George Island

A sandy island located approximately 45 km east of Long Point on Lake Winnipeg, it has a dense stand of spruce, willows and brush in its center. The shore on the north side of the island is sandy with surrounding grasses considered adequate for plovers, while the island's south side contains large rocks and a narrow shore.

21. Grassy Point

Located at the north end of Lake Winnipegosis this point extends approximately 1 km south from the north shore. Access to the point was not possible so it was viewed with a spotting scope and appeared to have long sandy beaches along its east side but the depth of the shoreline was not known, nor were any birds spotted.

22. Hecla Causeway

The area around the causeway is mainly marsh, unsuitable for plovers, unless there were some unseen flats in the marsh. A location scheduled to be visited but which was not checked is Sandy Point on the southwest part of Hecla Island. It has a sandy shoreline and lies between the Riverton shoreline and Hecla Island.

this site is beyond the northern range of Piping Plovers in Manitoba.

18. Elk Island

A small island off the northern part of Victoria Beach on the east side of Lake Winnipeg. It is composed of a sand spit with sand dunes, gravel and some grasses. This island offers excellent Piping Plover habitat on its southern shore. Although birds have nested there in the past, none were seen on 29 July. The absence of birds could have resulted from them having already migrated.

19. Finns

The shoreline along the west shore of Lake Winnipeg at this point consists of sand and gravel and is approximately 10 m wide. The problem with this site is heavy human use.

20. George Island

A sandy island located approximately 45 km east of Long Point on Lake Winnipeg, it has a dense stand of spruce, willows and brush in its center. The shore on the north side of the island is sandy with surrounding grasses considered adequate for plovers, while the island's south side contains large rocks and a narrow shore.

21. Grassy Point

Located at the north end of Lake Winnipegosis this point extends approximately 1 km south from the north shore. Access to the point was not possible so it was viewed with a spotting scope and appeared to have long sandy beaches along its east side but the depth of the shoreline was not known, nor were any birds spotted.

22. Hecla Causeway

The area around the causeway is mainly marsh, unsuitable for plovers, unless there were some unseen flats in the marsh. A location scheduled to be visited but which was not checked is Sandy Point on the southwest part of Hecla Island. It has a sandy shoreline and lies between the Riverton shoreline and Hecla Island.

23. Hnausa

The beach in the Hnausa area consists of sand and gravel and is approximately 15 m wide. There are areas where the beach is lined with dense forest and areas where it is bordered by open fields. This area has the possibility of holding birds but it is not likely, even though the nesting substrate is appropriate, due to lack of visibility.

24. Kawinaw Lake

Located south of highway 327 just west of Katimik Lake, it has some sand flats on the northwest shore but was unaccessible and could only be glassed with a spotting scope. No birds were seen although it appeared to contain suitable habitat.

25. Limestone Point

Limestone Point is located at the north end of Lake Winnipeg and partially encloses limestone bay. The point is a sand ridge which is wooded along its center but has an extensive, wide beach-front along its southern lake shore and a narrower beach along its northern bay shore. The southern shore exhibited excellent habitat for nesting, a beach approximately 50-70 m wide and 20 km long made of sand, scattered patches of gravel and some driftwood. It appeared to be a prime nesting area but no birds were seen there on 4 June or 17 July. It is likely that this area is beyond the bird's northern limit in Manitoba.

26. Little Limestone Lake

The shoreline of this lake, located in a limestone basin north of Grand Rapids, consists of large rocks and limestone with limited areas of smaller rocks and no suitable nesting area for Piping Plovers. The lake was glassed from the east shore and appeared to have similar shorelines throughout.

27. Long Point (north shore)

The north shore was checked via aerial survey at approximately 150 m. There appeared to be ample nesting areas including wide sandy shorelines adjacent to mature timber as well as sand ridges which were bordered by water on both sides. This area has potential and should be ground-checked.

28. Long Point (south shore)

The south shore of Long Point east of the north bar of Gull Bay was checked for approximately 4 km. The shore consists of piled rock of large size with dense forest close by, unsuitable for nesting plovers. The shore further east to the point's end was not checked but appears to consist of similar habitat.

29. Oak Point

Located on the east shore of Lake Manitoba this site was mainly a narrow shore with marsh, silt and some rock, unsuitable to the birds. It is not a likely feeding spot as the birds feed close to their nesting locations.

30. Patricia Beach

The shoreline along Patricia Beach on Lake Winnipeg is mainly sand approximately 30 m wide and lined with willows. It is an adequate nesting spot but no birds were seen there on 10 May. It is possible that human disturbance in the area limits its value for Piping Plovers.

31. Pebble Beach

This beach, located approximately 3 km north of Grand Rapids on Lake Winnipeg, has a sandy shoreline approximately 40 m wide and 150 m long. The shore continues beyond but is predominently gravel. The site is small but would probably support at least one pair if it were used.

32. Sandy Point

Northwest of Lundar on Lake Manitoba this beach provides a sandy shore approximately 2 km long and 10-15 m wide. It is bordered by intermittent stands of willows and has relatively good visibility. No birds were seen here, probably resulting from human recreational use, as it is in front of a cottage development.

33. Saskatchewan River

On 10 August, approximately 45 km of the Saskatchewan River was travelled east (downstream) of The Pas in search of Piping Plover habitat. The river was low in 1987 and more than normal amounts of shoreline and flats were exposed, therefore, optimum flat conditions were observed. In sections of the shoreline there were exposed flats (Wooden tent and Bucks Island) which could have held birds. No birds were seen and in a normal year these areas would have been covered by water. According to Rob Smith, there are only three sand, silt islands which are exposed every year and could provide adequate nesting areas. These islands are void of vegetation in the spring but become grassy thickets by the end of the summer. Therefore, nesting habitat is dependent on water levels, but the nesting possibility does exist. Other areas suggested by Rob Smith were Kelsey Lake which apparently has exposed shoreline consisting of sand and rock. Also mentioned were the marsh cells which Ducks Unlimited drains every year, exposing large mud flats that could be suitable for plovers. The Summerberry River was also suggested as it contains many more sand bars and exposed shorelines than the Saskatchewan River does. Rob Smith suggested speaking with Bob Uchtmann, Chris Smith and Don Sexton about further areas which contain suitable habitat.

34. Scotch Bay

Located on the east shore of Lake Manitoba, the shoreline is mainly marsh. The little that is exposed is narrow and too enclosed to attract any birds.

35. Sturgeon Bay

The Dauphin River empties into Sturgeon Bay on the west side of Lake Winnipeg. From that point the surrounding shoreline was glassed for plover habitat. There appeared to be some scattered areas which may be suitable. In conversation with Gypsumville Natural Resource Officers, there are some areas in the bay which have extensive sandy shores indicating that this area should be checked more thoroughly by boat as a possible breeding area.

36. Sturgeon Gill Creek

The shoreline north and south of Sturgeon Gill Creek on the west side of Lake Winnipeg was checked but was rocky and steep with dense woodlots up to the shore, hence, it is an inadequate site.

37. Twin Beaches

Approximately 3.5 km of shoreline at the south end of Twin Beaches was surveyed on 5 August. This is where Sue Haig had previously banded birds, but none were seen. The beach is approximately 15 m wide and is mainly sand with some small rock and has the potential for holding birds. It is possible that the birds had already left since it was late in the season for them.

38. Valhalla

A section of beach located north of Arnes on the west shore of Lake Winnipeg, the shoreline consists of sand and rock and is bordered by a dense tree stand. Although the substrate is good and approximately 15 m wide, it probably does not hold birds due to limited visibility caused by the trees.

39. William Lake

Located north of Grand Rapids, this limestone basin lake has a shoreline of spruce forest up to the water's edge on its east shore. Upon glassing the lake, it appeared that the remainder of the shoreline was grassy or marshy, with little if any suitable habitat.

40. Willow Point

Located south of Gimli, Willow Point extends out into Lake Winnipeg. The west shore of the point was approximately 30 m wide consisting of sand, silt and gravel but no birds were seen. The east side of the point had an extensive beach but only Semipalmated Plovers were observed there. Willow Island extends off the point; by glassing it, there appeared to be adequate sandy shoreline available. Since plovers tend to use such isolated areas, it should be checked.

DISCUSSION

More than 500 kilometers of unsurveyed Piping Plover habitat was searched in 1987. Ten locations were found to contain breeding Piping Plovers. Of these 10 sites, Long Point sand bar and West Shoal Lake contained over 70 percent of the birds recorded. Although Piping Plovers are known to shift their breeding locations from year to year, the fact that so many kilometers of habitat was unoccupied suggests that plovers are not abundant or widespread in Manitoba. A number of other sites could be checked, especially some of the east shoreline of Lake Winnipeg. These surveys might uncover other breeding concentrations; however, that is unlikely and measures to protect the two major breeding areas have higher priority. Areas yet to be surveyed are largely inaccessible and are not threatened by human disturbance.

To enhance the continued survival of the Piping Plover in Manitoba, management of the breeding areas on West Shoal Lake and the Long Point sand bar must be undertaken. That management should include three major goals:

1) Maintenance or enhancement of Piping Plover habitat.
2) Protection from human disturbance during the breeding season.
3) Protection from predation.

Once management programs are in place at those locations, other areas can be considered for similar management and less accessible areas can be surveyed.

RECOMMENDATIONS

The extensive nature of the 1987 Piping Plover survey proved to be too demanding for one person. The large area to be covered should have been divided between two people. Many locations could not be visited on a regular basis due to the distances between sites. The problem of transportation on Lake Winnipeg was a dilemma. This resulted from district personnel having to provide transportation to various locations. It was often difficult or impossible to arrange due to their other job priorities. Other modes of transportation such as with local fishermen were also difficult to arrange. The problem arose because fishermen were only paid for fuel used and were not being compensated for their equipment usage or time spent. Therefore, if future surveying is done it is suggested that:

1. Adequate funding be available to hire a person and boat for the time needed. This will be less costly and will require less time than trying to rely on opportunistic transportation sources.
2. The use of Departmental equipment if a large enough boat can be obtained.
3. Make arrangements with district officers for the use of their equipment for the short time needed to survey. This will require the hiring of a person or some transfer of funding to pay district personnel who are familiar with local water conditions.

There was a large amount of time spent on the north basin of Lake Winnipeg and time was often wasted due to a lack of equipment (boats, motors, etc.) and manpower for surveying the sites on the lake. It is estimated that a high intensity survey of the north basin would require the use of a boat and driver for a maximum of 2 weeks depending on weather conditions. It is recommended that existing locations which have birds be checked at least twice per year to determine their abundance, annual use, and to band the birds using them. Sites should be visited in late May or early June and again near the end of July.

Mist-netting should begin as soon as the adults are on territory since adults remain close to nest sites where capturing them is more effective. When mist-netting is done, more than one net, preferably at least three, arranged in a t-pattern should be employed. Mist-netting should include two or more people as the process of capturing birds and banding them requires more than one person.

HABITAT MANIPULATION

In the fall of 1987 an attempt at removing encroaching vegetation at the tip of the north sand bar of Gull Bay was done. A 3 hp "Merry Tiller" was transported to the point via trike and trailer. Upon proceeding with tilling, it was quickly found that tilling of the sand would take repeated passes and would require, at the minimum, a self driven rear-tined tiller. Even better would be the use of a garden tractor as this could be driven along the beach to the point. Due to the inaccessibility of most sites the rear-tined tiller would be best as it would have to be transported by boat.

It has been suggested by Paul Currier (Plant Ecologist from Nebraska) and George Bandel (South Dakota Game and Fish), to use a tractor and disker as they have had the best success with this method for controlling or enhancing plover habitat. They have apparently used most chemical and mechanical methods and have found disking to be the best.

ACKNOWLEDGEMENTS

This study was jointly funded by the Manitoba Department of Natural Resources, the Canadian Wildlife Service and World Wildlife Fund Canada. Robert Moszynski was the study coordinator for the Department of Natural Resources. He received previous Manitoba information and project design information from Sue Haig (North American Piping Plover Recovery Team Head).

The success of this study was largely due to the support of regional field staff including Dwain Strait and the other Natural Resource Officers in Grand Rapids. Their field assistance, lodging, and technical support was invaluable. Provincial fish culture staff headed by Gerald Orvice also provided time and equipment. Walter Cook, local Grand Rapids fisherman, assisted with direction and volunteered himself and his equipment to the study.

We are grateful to Rob Capozzi (volunteer from Quebec) for his two weeks in the field, Rob Smith (Keewatin Community College, The Pas) for boats, equipment and himself to survey the Saskatchewan River near The Pas, Herb Copland (Manitoba Museum of Man and Nature) and Paul Goosen (Canadian wildlife Service Representative, Edmonton) for a week of survey assistance. Richard W. Knapton (DNR) for surveys on Lake Winnipegosis and Stewart Holohan (local shorebird enthusiast) for his observations on West Shoal Lake.

CONTACTS

Paul Goosen (Canadian Wildlife Service) - color bands for birds

Gary Lingle and Paul Currier - Whooping Crane Maintenance Trust

- have done extensive work with Piping Plovers in Nebraska
- have used chemical and mechanical means of manipulating vegetation along Platte River. (308-384-4633)

George Bandel - South Dakota Game and Fish

445 E. Captial, Pierre S. Dakota 57501

605-733-3485

- has done work with plovers and found tilling to be best
- suggested the use of a black tarp over vegetation to kill it.

Dr. Sue Haig - Washington, D.C. Dept. of Zoological Research. Smithsonian Institution (202-673-4815) (field station 703-635-4166)

Grand Rapids District Office

Head NRO Dwain Strait

NRO Murray Zeilke

NRO Earl Simmons

Walter Cook - Grand Rapids resident

- very helpful for transportation and field work

Gerald Orvice - fish hatchery foreman

- has pass keys for bunk house and workshop

Appendix I.

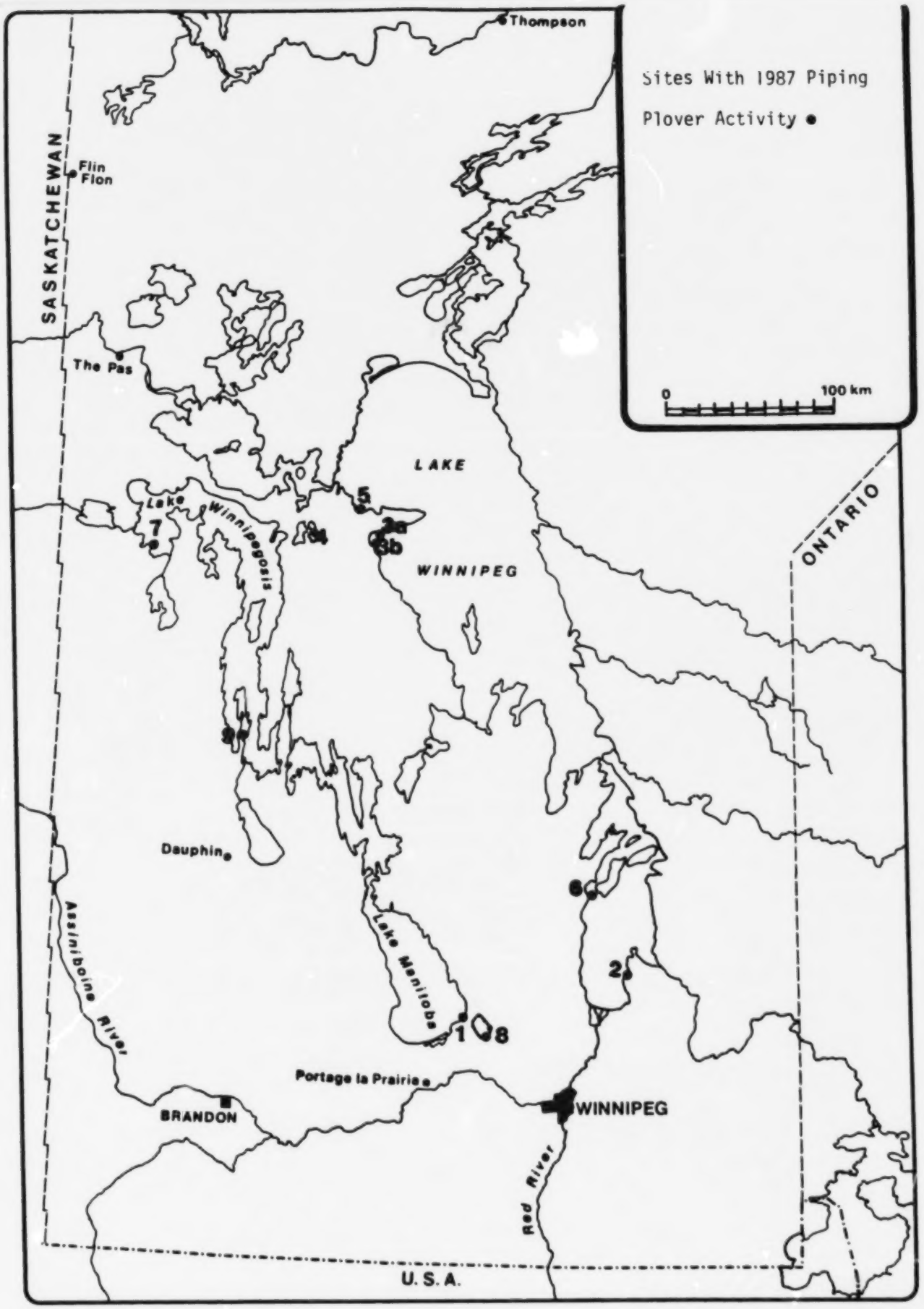
Site Identification Numbers for Manitoba Piping Plover Survey, 1987.

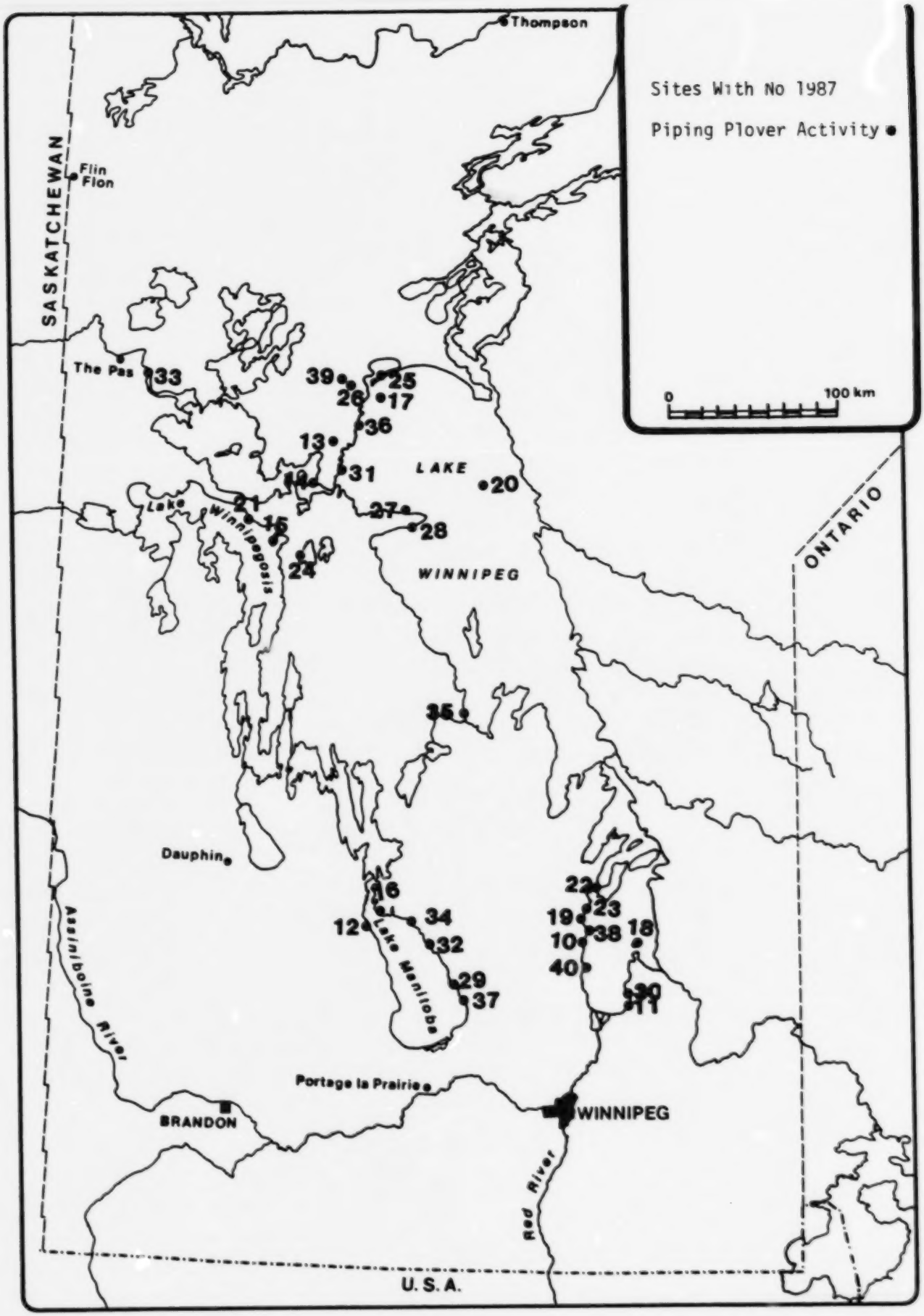
Active Sites

1. Clandeboye Bay Conservation Area
2. Grand Marais
3A. Gull Bay (North Bar)
3B. Gull Bay (South Bar)
4. Katimik Lake
5. Long Point
6. Riverton
7. Salt Point
8. Shoal Lake West
9. Winnipegosis

Sites with no Piping Plovers

10. Arnes
11. Balsom Bay
12. Bluff Creek
13. Buffalo Lake
14. Cross Bay
15. Denbeigh Point
16. Dog Creek Reserve
17. Eagle Island
18. Elk Island
19. Finns
20. George Island
21. Grassy Point
22. Hecla Causway
23. Hnausa
24. Kawinaw
25. Limestone Point
26. Little Limestone Lake
27. Long Point (North Shore)
28. Long Point (South Shore)
29. Oak Point
30. Patricia Beach
31. Pebble Beach
32. Sandy Point
33. Saskatchewan River
34. Scotch Bay
35. Sturgeon Bay
36. Sturgeon Gill Creek
37. Twin Beaches
38. Valhalla Beach
39. William Lake
40. Willow Point


Thompson
Sites With 1987 Piping Plover Activity ●
0
100 km
SASKATCHEWAN
Flin Flon
The Pas
LAKE
WINNIPEG
ONTARIO
Lake Winnipegosis
Dauphin
Lake Manitoba
Assiniboine River
Portage la Prairie
BRANDON
WINNIPEG
Red River
U.S.A.
5
3a
3b
7
8
6
2
1
8


Sites With No 1987
Piping Plover Activity
0
100 km
Thompson
SASKATCHEWAN
Flin Flon
The Pas
33
39
25
26
17
36
13
31
LAKE
20
Lake
Winnipegosis
21
15
27
28
24
WINNIPEG
ONTARIO
35
Dauphin
16
34
12
Lake Manitoba
32
29
37
22
23
19
38
18
10
40
30
11
Assiniboine River
Portage la Prairie
BRANDON
WINNIPEG
Red River
U. S. A.

Appendix II

DISTRIBUTION AND STATUS OF PIPING PLOVERS IN MANITOBA-1986

Susan Haig, Dept. of Biol., U. of N.D., Grand Forks ND 58202 and Delta Waterfowl and Wetlands Research Station, Portage la Prairie, Man. R1N 3A1.

Piping Plovers are an uncommon shorebird species that have recently been declared endangered in Canada (Haig 1985) and threatened in the United States (Sidle 1985). Currently, less than 4,000 Piping Plovers remain, with the vast majority of birds inhabiting prairie lakes and sloughs (Haig 1985, 1986b,c, Haig and Oring 1985a, 1986a). Since 1981, the distribution and status of Piping Plovers has been under investigation in Manitoba (Haig 1986a). Results prior to 1986 showed that 44 pairs of Piping Plovers bred at 7 sites in the province, and an additional 30-40 non-breeding birds (possibly migrants) were frequently observed. Observation of a significant number of "extra birds" and knowledge of the wide dispersal abilities of adults during the breeding season, as well as between years (Haig 1987), prompted the initiation of a provincial search for previously unknown breeding areas in 1986.

METHODS

The 1986 study was organized by a core group of four biologists from the Manitoba Dept. of Nat. Resources, and the author (Table 1). A volunteer network of 25 individuals provided additional knowledge and man-power to carry out the study (Table 1). Notices were placed in local papers and in DNR publications to solicit further information. Past and present breeding records were reviewed to determine potential areas for the survey. As a final step in determining possible breeding sites, over 80 hours were spent surveying the province by air and mapping beach sites.

Table 1. 1986 participants in Manitoba Piping Plover survey.

1. Susan Haig, Coordinator
2. Merlin Shoesmith
3. Robert Nero
4. Bill Koonz
5. Ken De Smet

---

6. John Christie
7. Pat Christie
8. Norman Cleveland
9. Clark Cluff
10. Herb Copland
11. Calvin Cuthbert
12. Dave Clayton
13. Celas Davar
14. T. Galloway
15. Stewart Holohan
16. Kathy Johnston
17. Rudy Koes
18. John Morgan
19. Ted Muir
20. Raymond O'Connor
21. Paul Paquet
22. V. Pelch
23. Henry Pops
24. Pat Rakowski
25. Don Sexton
26. Tim Sopuck
27. Peter Taylor
28. Bill Walley
29. Doug Stephanson
30. Carl Hendrickson

RESULTS

Aerial surveys covered the majority of shoreline on: Lake Winnipeg, Lake Winnipegosis, Lake Manitoba, the Shoal Lakes, Cedar Lake, and Moose Lake (Fig. 1). Results indicate at least 30 sites, not currently known to be inhabited by Piping Plovers, show potential for breeding activity (Table 2, Appendix 1). The majority of these sites occur in Lake Winnipeg where islands and northern beaches have been difficult to survey in the past.

Thirty-six sites were ground-surveyed at least once during 1986 (Table 3). Of these areas, four were primarily used by migrants; Beausejour, Grassmere, Proulx Point, and Oak Hammock Marsh (Fig. 2). West Shoal Lake is also an important migration site. Piping Plovers bred at seven sites: Clandeboye Bay, Twin Lakes Beach, West Shoal Lake, Grand Marais Island, Grand Marais spit, Long Point, and possibly Whitewater Lake (Fig. 2). A 1985 breeding record from Elk Island was also included because the site was not able to be checked in 1986. The only new breeding site was Long Point on Lake Winnipeg. Discovery of Piping Plovers on Long Point extends their current northern breeding range in Manitoba by 130 km.

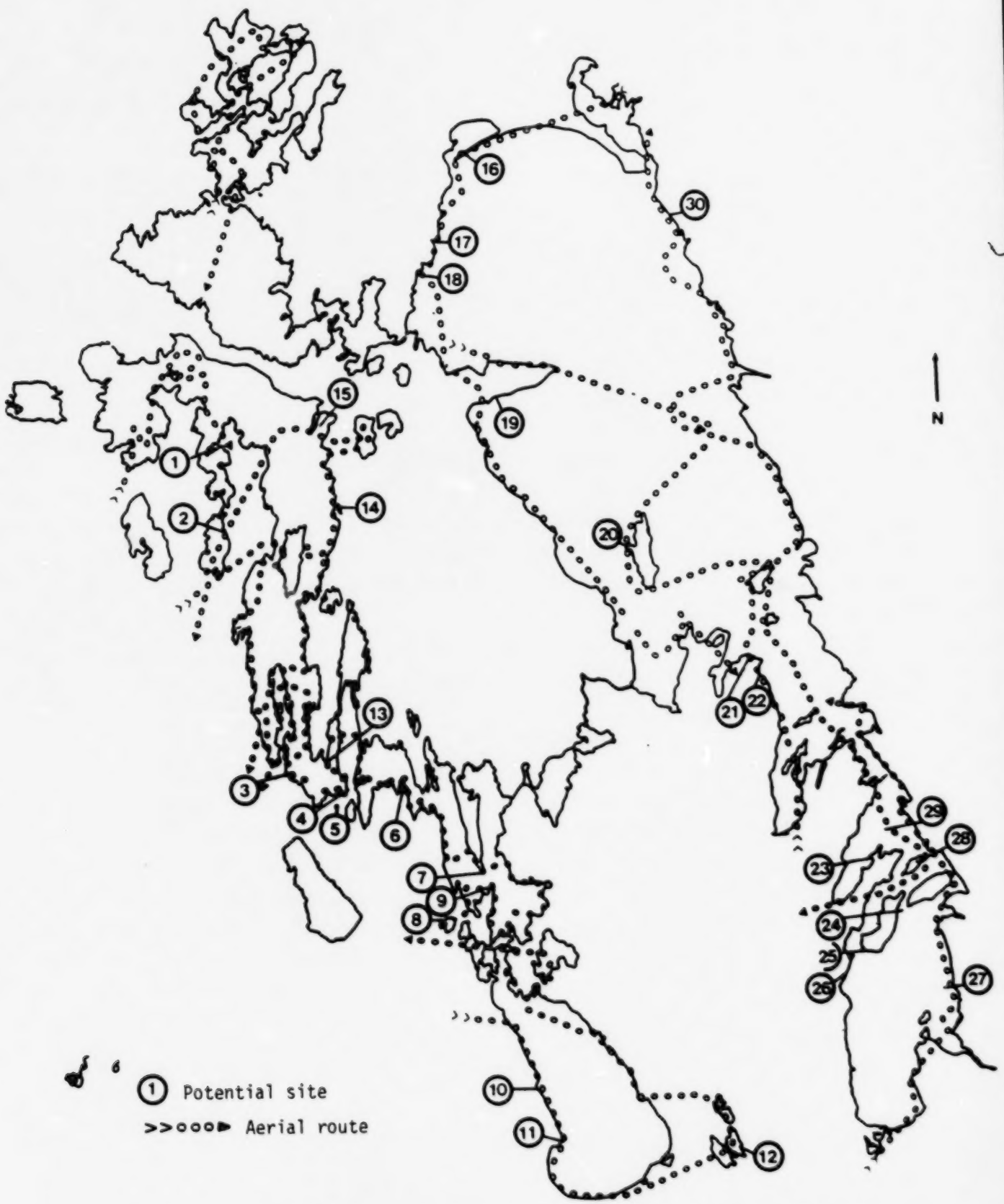


Figure 1. 1986 aerial routes and location of potential Piping Plover habitat.

Table 2. Potential Piping Plover habitat as seen from aerial surveys (sites that were ground-checked in 1986 are not included).*

Location	Map Reference Number**
East Shoal Lake	12
Lake Manitoba	
Big Point	11
Bluff Harbor	9
Little Sandy Point	6
Marius	10
Peonan Point	7
Lake Winnipeg	
Black River Delta	27
Buffalo Creek Bay	18
Deer Island	28
Egg Island	29
Grindstone Park	23
Gull Bay	19
Hecla Island	25
Limestone Point	16
Montreal Point	30
Punk Island	24
Reindeer Isand	20
Riverton	26
Robinson's Point	17
Stony Point	22
Wicked Point	21
Lake Winnipegosis	
Farmer's Piont	3
Goose Bay Area	15
Meadowlands	4
Moose Point	2
Pelican Bay	1
Point LaRonde	14
Salt Point	13
Lawrence Lake	5
Lonely Lake	8

*Appendix A has specific comments on locations
**Map numbers refer to Figure 1.

Table 3. Summary of areas surveyed for Piping Plover use in 1986.

Location #	#PPL	Date	Obs**	Comments
Beausejour (9)	1	7 June	27	Sewage lagoon-migrants
Diamond Lakes	0	18 June	6,7	High water, no disturbance
East Shoal Lake	0	18 July	5	Pasture poor habitat
Grassmere (8)	1	29 May	15	Sewage lagoon-migrants
Kawinaw Lake	0	16 June	6	NE corner, too many gulls
Lake Kiskitti	0	June	24	Little Habitat
Lake Manitoba	*9-11 adults			*Total
Big Sandy Bay	0	4 July	5	Good habitat
Clandeboye (2)	4-6	1 June	1	2 nests, high disturbance
Hollywood Beach	0	June	20	Nests in '82 &'83
Proulx Point (5)	3	15 Sept.	26	Migrants on cobble shore
Sandy Bay North	0	4 July	5	Good habitat-north
Sandy Bay	0	Late May	25	High water
Sandy Bay South	0	8 June	8	Good habitat
Stony Beach	0	1 June	1	Good habitat
Swan Creek Hatchery	0	2 July	26	Good habitat
Twin Lakes Beach (4)	2	2 June	1	1 nest, high disturbance
Lake Winnipeg	*18 adults 24 chicks			*Total
Barens Island	0	10 June	5	Good habitat, no PPL
Elk Island (11)	2+	3 July	17	1 nest in 1985
Grand Marais Is. (10)	6+10	17 July	5,10	3 pair, 10 chicks
Grand Marais Spit (10)	1	28 July	5,10	Non-territorial
Grand Rapids	0	16 June	6,7	High water, good
Long Point (6)	9+14	31 July	5,6,10	South bar-2 censuses
Lynx Point	0	11 June	5	Good habitat
Lake Winnipegosis	*0			*Total
Denbeigh Point	0	16 June	6,7	High water, no habitat
Oscar Point	0	17 June	6,7	Better w/low water
Oscar-Denbeigh	0	17 June	6,7	Shoal under water
Overflowing River	0	17 June	6,7	Better w/low water
Salt Point	0	17 June	6,22	High water
Lawrence Lake	0	13 June	5	High water
Lizard Point I.R.	0	17 June	6,7	3 alkali lakes
Moose Lake	0	June	9	Too much Disturbance
Oak Hammock Marsh (7)	3	June	6,15,17,19	Migrants, 4 censuses
West Shoal Lake (3)	37+31	June	1,6,15	High water
West Shoal Lake Is.	0	18 July	5	Poor habitat
Whitewater Lake (1)	2-3	June	6,11,15	High water, 3 censuses
Whitemouth Lake	0	June	9	No beach habitat
Total	62-69 breeding adults + 55 chicks			

*Map reference number in () refers to figure 2.
**Obs=Observer number (see table 1).

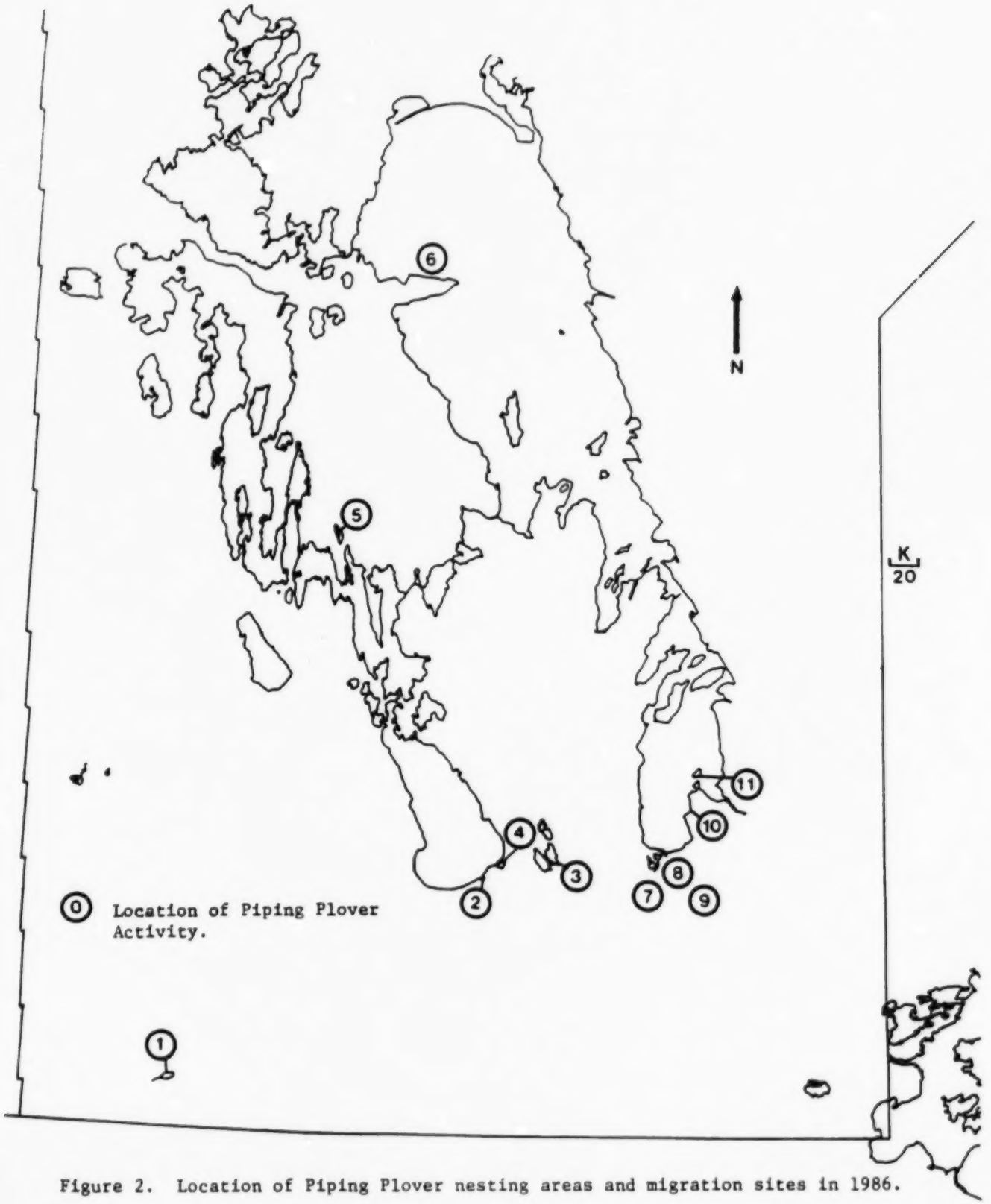


Figure 2. Location of Piping Plover nesting areas and migration sites in 1986.

Census totals indicate that 62-69 adults bred in the province and at least 55 chicks hatched (Table 3). Estimates for West Shoal Lake may be low due to incomplete censuring of the south shore. The total population estimate for known sites in 1986 ranges between 65-90 adults. The number of chicks fledged is most likely 55 or less.

Banded birds were observed at Clandeboye Bay, Twin Lakes Beach, Grand Marais, and Long Point. Marked individuals on Long Point had been banded at West Shoal Lake and at Lake of The Woods, Mn. In addition, K. De Smet and H. Copland banded 9 juveniles on Grand Marais Island (Appendix 1).

DISCUSSION

Status of Piping Plovers in Manitoba: Results from 1986 survey work indicates that the number of breeding Piping Plovers in the province is approximately the same as the 1985 estimate. High water levels found throughout the province may account for a decrease in the number of birds observed at previously-used sites such as Whitewater Lake, West Shoal Lake, Grand Marais Island, Lawrence Lake, and Salt Point. Variation in Census techniques from past years may also account for discrepancies in the number of birds seen. It is significant to note that the number of birds on the southeast corner of Lake Manitoba (i.e. Twin Lakes Beach, Clandeboye Bay, and Stony Beach) continues to decline and reproductive success was negligible for the fourth year in a row.

Threats to Piping Plovers in Manitoba: Disturbance to nesting birds from recreational activity remains the most critical threat to Piping Plovers on Lake Manitoba, Grand Marais, Long Point, and possibly other sites. High water levels also pose a significant threat to the birds. If these high water levels are maintained for a number of consecutive years, permanent habitat destruction will occur and the tradition of using the sites will be broken. The impact of predators such as gulls, skunks, or raccoons has not been accurately assessed. Cattle grazing along Lake Manitoba, Lake Winnipegosis, and West Shoal Lake may become a problem in the future.

Conservation Measures: Since 1982, nest sites at Clandeboye Bay have been designated a "Special Conservation Area" by the DNR. Signs have been posted, but have not been effective due to lack of enforcement. Human disturbance is

quite intense at Long Point and has prompted DNR officials to initiate closing-off of nesting areas for the 1987 breeding season. Birds breeding on Grand Marais (spit and island) also suffer the consequences of human disturbance to nesting areas. These two areas are critical nest sites as the link between birds breeding at Lake of the Woods, MN and breeding areas in Manitoba (Haig 1987). It is critical that these sites be protected in the immediate future. In reality, the best way vulnerable sites such as Clandeboye Bay, Long Point, West Shoal Lake, and Grand Marais may be preserved is through direct purchase by groups such as The Nature Conservancy or Wildlife Habitat Canada. Perhaps this private interest would insure better protection and eliminate future development of sites.

Future Studies: Results from 1986 indicate there is significant indication of further use of Manitoba beaches by Piping Plovers. Aerial surveys from Lake Winnipeg are especially encouraging. A conversation with C. Hendrickson (July 1986) indicated that a number of Piping Plovers nested on Tamarack Island, Sandy Island, and the south side of Gull Bay during the 1960's (Appendix I). None of these sites have been checked recently. Beaches on Hecla Island and Elk Island had birds 1-2 years ago but were never thoroughly investigated. Salt flats on Lake Winnipegosis also have potential if water levels subside.

To insure important sites are not overlooked, I propose an intensive search for Piping Plovers along Lake Winnipeg in 1987. Further aerial surveys could be incorporated with Colonial Bird Surveys. Most importantly, however, all potential sites will have to be ground-checked between late May and early July. Piping Plover breeding distribution is sporadic and nesting occurs in very localized areas (Haig 1985a, 1986b, c, Haig and Oring 1985, 1986a). Unfortunately, this means that many kilometers of potential habitat may have to be surveyed before nest sites are found. While this is a tedious process, and it may appear that Manitoba has "had its share" of Piping Plover surveys, discovery of a number of significant sites on Lake Winnipeg seems quite probable.

The significance of Manitoba to Piping Plovers cannot be over-emphasized. In the past, Piping Plovers were distributed from Alberta to Newfoundland (Bell 1978, Haig 1985). Currently, the middle part of the species' range (i.e. the Great Lakes region) has less than 18 pairs of birds (Haig and Oring 1985, Haig 1986b). This gap creates a serious dilemma if

genetic diversity is to be maintained for the species. It also decreases the number of dispersal sites available to birds on the fringes of prairie and Atlantic populations. The fact that birds from Minnesota are regularly seen moving into Manitoba (Haig 1987) strengthens the importance of identifying and protecting sites in the province.

Ideas concerning maintenance of population continuity are not new to geneticists, but are just coming of age for wildlife managers (Temple 1977, Frankel and Soule 1981, Schonewald-Cox et al 1983). If Piping Plovers in Manitoba are examined from an international perspective, and ideas of current endangered species management are put into practice, it is easy to realize that loss of any site in Manitoba significantly widens the gap (geographically and genetically) between inland and coastal birds. Knowledge of new areas in the province would ease the threat of population fragmentation. Loss of peripheral sites also decreases the buffer zone surrounding densely populated areas in Saskatchewan and North Dakota. As a final note: 1986 census results from Minnesota (Haig and Oring 1986) and Saskatchewan (Hjertaas, pers. comm.) indicates that Piping Plovers in both areas suffered a severe decline this year. Obviously, if birds in even the most stable areas are threatened, identification and protection of new sites is crucial.

CONCLUSIONS

In 1986, 7 breeding sites in Manitoba contained 62-69 adult Piping Plovers and produced 55 chicks. Aerial surveys indicated sites on Lake Winnipeg harbor great potential for Piping Plover breeding activity. Threats to nest sites include intense human disturbance and high water levels. It is strongly recommended that human activity be prohibited on all known nesting areas in the province and that plans be made to carry out future surveys of potential nesting habitat on Lake Winnipeg.

ACKNOWLEDGEMENTS

This study was made possible through funding and other resources provided by the following groups: Manitoba Dept. of Nat. Res., World Wildlife Fund (Can.), Delta Waterfowl and Wetlands Research Station, and the Univ. of N.D. The cooperation of volunteer surveyors is also appreciated.

LITERATURE CITED

Bell, F.H. 1978. Status of the Piping Plover in Canada. Report to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), National Museum of Canada, Ottawa.

Frankel, O.H. and M.E. Soule. 1981. Conservation and Evolution. Cambridge University Press, London.

Haig, S.M. 1985. Status of the Piping Plover in Canada. Report to COSEWIC, National Museum of Canada, Ottawa.

----------1986a. Status of the Piping Plover in Manitoba: management recommendations for recovery. In: Proceedings of Prairie Endangered Species Symposium. Canadian Wildlife Service, Edmonton, Alberta (in press).

----------1986b. Endangered Species Information System Species workbook. Part 1-Piping Plover Distribution. U.S. Fish and Wildlife Service, Washington D.C.

----------1986c. Endangered Species Information System Species Workbook. Part 2-Piping Plover Biology. U.S. Fish and Wildlife Service, Washington D.C.

----------1987. Population biology and life history strategies of the Piping Plover. Ph.D. dissertation, University of N.D. (in prep.).

----------and Oring. 1985. The distribution and status of the Piping Plover throughout the annual cycle. Journal of Field Ornithology 56(4): 334-345.

----------. 1986a. The Piping Plover. In: Audubon Wildlife Report 1987. National Audubon Society, New York, (in press).

----------. 1986b. Populations evaluation of Piping Plovers at Lake of the Woods, MN. Report submitted to Minnesota DNR.

Sidle, J. 1985. Determination of endangered and threatened status for the Piping Plover. U.S. Federal Register 50(238): 50720-34.

Schonewald-Cox, C., S. Chambers, M. MacBryde, W. Thomas (ed.). 1983. Genetics and Conservation. Benjamin/Cumings Inc. London.

Temple, S.A. 1977. Endangered Birds: Management Techniques for preserving threatened species. University of Wisconsin Press, Madison WI.